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Cumulative Frequencies of Behavior Analytic Journal Publications Related to Human Research on Gambling

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This brief review investigates the frequency with which gambling-related articles in behavior-analytic journals are being published. Results of this investigation yield important information regarding the recent growth of gambling-related publications within the behavioral community. Specifically, cumulative frequencies show an increasing trend in gambling-related publications between 1979 and 2012, with substantial growth occurring after 2006. These data are considered in light of Dixon's (2007) editorial in the inaugural issue of the *Analysis of Gambling Behavior*.
Keywords: Gambling; Gaming; Cumulative record; Publication trends

Behavior analysis has been relegated as being out of touch with what gamblers face. For example, Griffiths (1999) stated that "…no simple parsimonious explanation of gambling maintenance [i.e., operant conditioning] will ever be sufficient to explain all cases" (p. 444), and went on to say that reinforcement contingencies are "simple" (Griffiths & Parke, 2003; p. 12). The potential for behavior analysts to be viewed as novices in the gambling research arena or to be accused of being unable to adequately explain gambling behavior with behavioral principles is an issue Dixon (2007) addressed as a possible outcome of behavior analysts' relative inaction toward gambling research.

Dixon pointed out that in the years from 1997 to 2006 the rate of PsycINFO returns for the keywords "Pathological Gambling" increased from 29 to 142. This search was recently conducted again, and as of July, 2013, the 1997 and 2006 results increased to 34 and 200, respectively[1], with an additional 264 being published in 2012. Of course, broader terms used in PsycINFO like "Gambling" yield bigger returns (e.g., 572 for 2012). Thus, in line with Dixon's original argument, while there are growing trends in gambling publications, the possibility that behavior analysts are not devoting the attention toward gambling that other branches of the behavioral sciences are certainly exists.

In the inaugural issue of the *Analysis of Gambling Behavior*, Dixon (2007) offered two solutions to deal with the paucity of behavior-analytic research on gambling. First, Dixon argued for the establishment of a peer-reviewed behavior-analytic journal on the subject of gambling, which the publication of the *Analysis of Gambling Behavior* accomplished. The second solution was to convince the behavioral community to turn their attention toward the issue of problem gambling, with the understanding that our field is best suited to address the needs of those identified as problem gamblers. There is evidence of increased interest in gambling research among behavior analysts (e.g., Weatherly, 2011); however, answering the question of where

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[1] This change may be due to increased journal coverage in PsycINFO and potential changes in search algorithms, though this is only speculative.

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these interests lay and how they have changed with time may serve to identify growing trends and areas that need to be addressed further. While Dixon (2007) attended to problem gambling in particular, a broader treatment of the topic of gambling is necessary to build a foundation upon which behavior analysts can better respond to the need of effective treatments for that population.

It is in this light that the current investigation is presented, which focuses on articles published in behavior-analytic journals that deal directly with issues related to human gambling. Results are discussed in terms of trends across journals and article types. The review concludes with a brief discussion of the future of gambling research in behavior analysis.

METHOD

Article Inclusion

Articles were selected from seven behavior-analytic journals that have published articles on gambling up to and including the year 2012. Other journals were considered, but they either had not published gambling research (e.g., *Behavior Analysis in Practice*) or were not exclusively behavioral in their focus (e.g., *Journal of Gambling Studies*), despite having published some behavioral articles (e.g., Weatherly, Miller, Montes, & Rost, 2012). The journals included in the analyses were the *Journal of Applied Behavior Analysis* (JABA), the *Journal of the Experimental Analysis of Behavior* (JEAB), *Behavior Modification* (Bx Mod), *The Psychological Record* (TPR), *The Behavior Analyst* (TBA), *Behavior Research and Methods* (BRM), and the *Analysis of Gambling Behavior* (AGB). Searches were conducted through the journal's abstract search option (JABA, JEAB), through PsycINFO (Bx Mod, TPR, TBA, BRM), or through reading each hardcopy of the journal (AGB[2]). The following terms were used for abstract and PsycINFO searches; gambling, gaming, casino, slot machine, poker. Articles were removed from the final list if the article did not limit its content to issues of human subjects.

Variable Selection

Journal name and year of publication were recorded for each article and served as a focal point of analysis in terms of both total articles per journal and cumulative publications over time. Article types were categorized as experimental, descriptive, methodological, theoretical, treatment, book review, technical, or other. Experimental articles manipulated some variable and measure its effect on at least one dependent variable. Descriptive articles investigated differences in measures between populations (e.g., delay discounting between pathological and non-pathological gamblers). Methodological articles provided guidelines on approaches to research topics. Treatment articles focused on the improvement of problem gambling. Book review articles, of course, provide a review of a gambling-related book. Technical articles investigated instrument development. Lastly, any article that did not meet criteria for the above mentioned article types were relegated to the category of 'other,' and included articles such as commentaries and author responses.

Three overarching populations of participants were identified; problem gamblers, non-problem gamblers, and non-gamblers/other. Problem gamblers consisted of any identified pathological or problem gamblers. Non-problem gamblers were comprised of recreational gamblers and those identified as historically gambling without identified pathology. The last category, non-gambler/other, was inclusive of studies in which no classificatory

[2] Alternatively, sources like Google Scholar may make these searches possible for journals not listed on databases like PsycINFO.

tool was used to identify gambling severity, when the population consisted of undifferentiated individuals (e.g., university students), or those who reportedly never gambled. With these divisions, it was possible for one study to have two or more population categories endorsed in the final analysis.

The type of gambling was codified and included slot machines, horse racing, poker (both video and live), blackjack, dice/craps, lottery, sports betting, dog racing, roulette, other (e.g., "casino games"), and modified board games for children. Again, it was possible for more than one category to be included in any given study.

Lastly, the incentive strategy was recorded. Five divisions of incentives were identified, and included extra credit for coursework, remaining money won after participating in the game (e.g., having $15 left after playing a slot machine would result in $15 granted to the participant), a percent chance at some monetary prize (e.g., drawing one participant name after the study to award them $25), a gift card upon completion of the study, and an additional category for those studies that reportedly gave no incentive for participation. It was possible for a study to endorse more than one type of incentive for participation.

RESULTS AND DISCUSSION

A total of 119 articles were identified across the seven journals subjected to analysis, beginning in 1979, and a cumulative graph of these publications by year is presented in Figure 1. Once the articles were selected, inter-observer agreement was calculated with a second observer for 28.57% (n = 34) of the articles across all variables of interest and achieved 100% agreement for occurrence and nonoccurrence of each variable. Publications by journal, article type, population, game type, and incentive are shown in Table 1. Data show that AGB is the most frequent publisher of gambling articles of the seven (n = 82; 68.91% of all articles), experimental studies are the most frequently published study type (42.02% of all articles), slot machines are the most cited gaming type investigated (24.37% of all articles), and extra credit is the most frequently reported type of incentive for gambling research (46.00% of all experimental articles).

Data regarding population type show more non-problem gamblers (48.00% of experimental articles) in research studies than problem gamblers (32.00%) and non-gamblers (14.00%) combined. However, when considering all factors analyzed, there

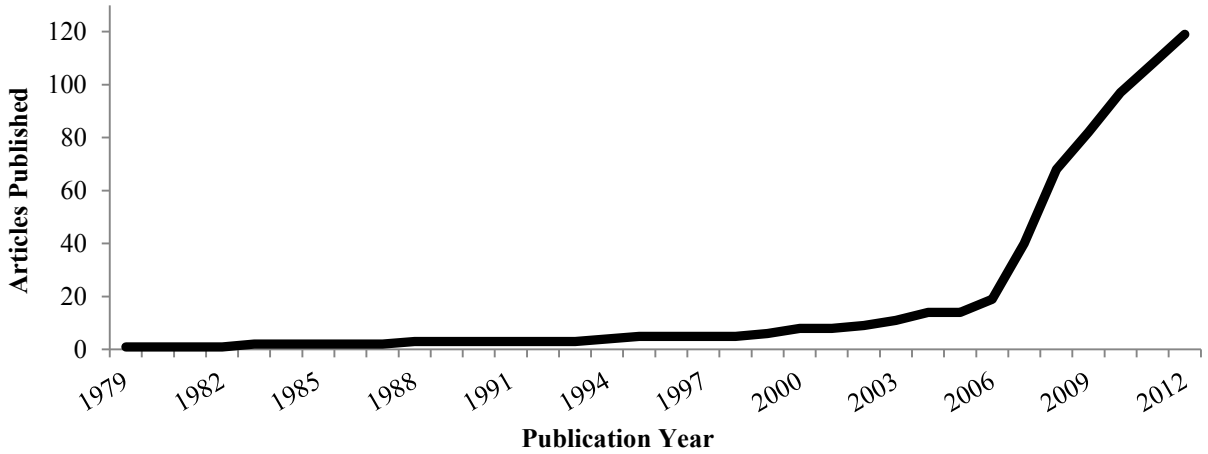

Figure 1. Cumulative gambling-related publications across all analyzed journals.

Category	Variable	n
Journal	AGB	82
	JABA	13
	TPR	10
	Bx Mod	5
	BRM	4
	TBA	3
	JEAB	2
Article Type	Experimental	50
	Descriptive	17
	Theoretical	9
	Treatment	8
	Technical	6
	Book Review	2
	Methodological	1
	Other	26
Population	Problem	16
	Non-Problem	24
	Non-Gambler/Other	7
Gaming Type	Slot Machine	29
	Poker	14
	Horse Racing	5
	Roulette	5
	Blackjack	4
	Dice/Craps	3
	Sports Betting	3
	Board Game	2
	Lottery	2
	Dog Racing	2
	Other	1
Incentive	Extra Credit	34
	Money Won	15
	Gift Card	11
	% Chance at $	10
	None	2

Table 1. Number of articles by journal, article type, population, gaming type, and incentive.

appear to be a mixture of article types, populations, foci of games studied, and incentives, demonstrating a diversity of interests and strategies amongst researchers.

Figure 2 is a cumulative frequency of five article types. Book reviews and methodological types were removed from this search as their frequencies were too low to determine any specific trends. The category "other" was also removed as this category was too wide-ranging and may have produce a false perception of unity among those articles—that potentially unrelated articles are trending in the same direction when they may not. The remaining types, descriptive, experimental, theoretical, treatment, and technical, show similar frequencies prior to 2006. However, from 2006 to 2012, the experimental type showed the greatest growth in terms of numbers of publications, followed by the descriptive type. The remaining three types are relatively similar in their trends from 2006 to 2012.

One issue arose during coding. Specifically, gaming type proved difficult to code as several studies were conducted within a specific gaming venue (e.g., off-track betting parlor), which may have been unrelated to the study's focus. For example, Dixon, Marley, and Jacobs' (2003) sample for studying delay discounting by pathological gamblers consisted of individuals betting on horse races at an off-track location. In this example, the gaming type was recorded as horse racing, which may or may not be related to the purpose of the study, which was to examine delay discounting rates.

Additional articles that are arguably related to gambling were not included in this review. For example, articles on risky choice, which can be found in the discounting literature, were not included unless they focused on some aspect of gambling (e.g., problem gamblers). Additionally, this review is reported in light of Dixon's (2007) concern regarding behavior analysis' pursuit

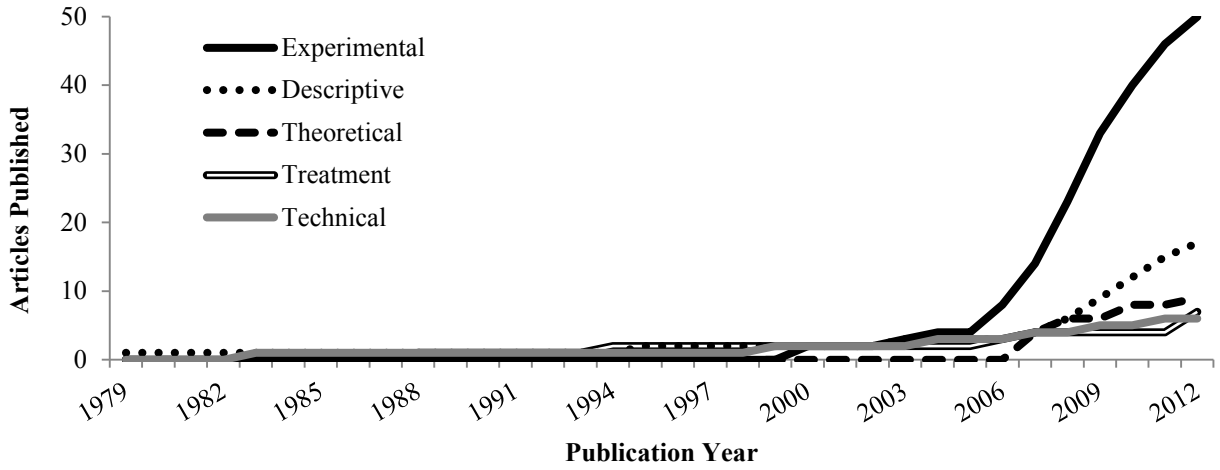

Figure 2. Cumulative publications across article type.

of gambling research. There exist, however, non-behavioral journals which may be of interest in other investigations regarding the impact behavior analysts might be having in the larger domain of gambling research. Such an investigation is beyond the scope of this article, and may require additional time before any discernible trend or impact emerges.

In sum, the current review shows that the pursuit of gambling research is growing within our field. Specifically, cumulative records indicate an increasing frequency of gambling-related publications in seven behavior-analytic journals with a diverse range of topics and populations. With respect to Dixon's (2007) second solution to the inactivity of behavior analysts' pursuit of gambling research, that of increased interest, we can conclude that as a field we are certainly moving in the right direction.

These findings are promising for those starting lines of research at university settings. Specifically, the faculty member may be asked to supervise or produce research in basic, applied, and/or theoretical domains, and potentially under budgetary restrictions preventing the use of expensive equipment. Research in gambling addresses each of these concerns (e.g., Dixon & Holton, 2009; Arntzen & Stensvold, 2007; Porter & Ghezzi, 2006; Dixon & Schreiber, 2002, respectively). Additionally, the National Centers for Responsible Gaming provides grant funding specifically for gaming research, and has financially supported behavioral approaches to treatment. Both awards listed on NCRG's grant site (www.ncrg.org) were for research investigating the utility of Acceptance and Commitment Therapy in the treatment of near miss magnitude effects in underage pathological gamblers. This suggests that not only is gambling research in behavior analysis expanding, it is also capable of being financially supported from outside sources.

While the increase in rate of publications in gambling by behavior analysts is promising, there is still much work to do in the refinement of current investigations and the identification and pursuit of new avenues of research. For example, research in the role of money in gaming laboratories has yielded interesting results, though more work is certainly needed. Weatherly and Meier (2007) and Peterson and Weatherly (2011) conclude that participants gamble similarly for a chance at a gift card as they do for real money. Additionally, participants' economic statuses may play a signifi-

cant role in how they gamble in these laboratory conditions (e.g., Peterson & Weatherly, 2011; Weatherly, Mari, & Montes, 2012). What remains to be seen, however, is how the outcomes of these studies compare to gambling in the natural environment. Indeed, that risk of previously-earned conditioned reinforcers (i.e., money) is at stake for the gambler is a point of concern in the development of gambling laboratories interested in external validity.

Caution must be taken, however, as wagering with one's own or someone else's money in non-casino environments may be illegal in the researcher's state (see Dodds, 2008). That is, researchers may be legally restricted from laboratory work in which the participant gambles with their own money or where the credits earned in the lab are exchangeable for money. This last point, of legal restrictions, will require creative solutions in the pursuit of external validation of current methodologies, and efforts are underway which may help us answer these questions (cf. Brandt, Sztykiel, & Pietras, 2013).

The role of money in gambling laboratories is but one of myriad issues to be resolved by the behavior-analytic community. For example, investigations into slot machine bonus rounds has remained untouched, and may be of interest in investigations looking at the formation or maintenance of problem gambling. Gambling research may also be the foundation from which newer theoretical approaches might be pursued, such as with relational frame theory. Indeed, the relational framing of poker rules (e.g., Hoch, Witts, & Weil, 2012; 2013; cf. Dymond & Roche, 2010), and the internet poker player (e.g., Costello & Fuqua, 2012; Witts & Lyons, 2013) may help to elucidate how to prevent or treat problem gambling, as those understanding the mathematical rules may be less inclined to gamble in a risky fashion (e.g., Costello & Fuqua, 2012)—though rigorous peer-review is currently limited. As of today we have more questions than we have answers, making this a truly exciting time to be a researcher interested in gambling.

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